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EXAMINER

LAXTON, GARY L

ART UNIT	PAPER NUMBER
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2838

DATE MAILED: 02/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/260,478

Applicant(s)

TITARU, IONEL

Examiner

Gary L. Laxton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 36-73 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 36-73 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the switching element controller of claim 39; and, the source controller of claim 41 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim 41 depends from claim 39. Both claims claim two different controllers. The drawings do not show any controllers.

2. Figures 2, 3A, 3B, 8A, 8B, 9A and 9B should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

The specification refers to these figures as prior art.

***Specification***

3. The disclosure is objected to because of the following informalities:

Page 7 lines 3 and 4 of the specification recite "Figure 1". Both recitations of Figure 1 should be changed to Figure 1A.

Page 17 line 19 recites "claim 4A". There is no claim 4A.

Appropriate correction is required.

4. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

***Claim Objections***

5. Claims 54, 57 and 69-72 are objected to because of the following informalities:

Claims 54 and 57 are duplicate claims that depend from the same claim 53. one claim needs to be cancelled or needs to depend from another claim.

Claim 69 recites the limitation "said power output" in line 11. There is insufficient antecedent basis for this limitation in the claim. Claims 70-72 inherit the same from claim 69.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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7. Claims 41-43 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 41 and 42 depends from claim 39. Claim 39 claims a controller while claims 41 and 42 claim a different controller. The specification is silent about two different controllers. For examination purposes, the examiner assumes there is only one controller. Claim 43 inherit the same from claim 42.

### ***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

9. Claims 36, 37 and 39-46 are rejected under 35 U.S.C. 102(e) as being anticipated by Fraidlin et al (US 6,038,142).

Claims 36, 37, and ; Fraidlin et al, figure 1, disclose a converter having a transformer (110) and a power output side (14), a source of DC current ( $V_{in}$ ) and a set of switching elements (103-106) for connecting the source to the primary winding; a bridge of rectifiers (119, 120); an inductor (111) connecting the source to the primary winding.

Claim 39; Fraidlin et al, figure 1, disclose wherein the set of switching elements comprises two pairs of controlled switching elements (103-16) and a switching element controller (124), the switching elements of each pair being coupled together in totem pole configuration at corresponding output nodes of the pair, the pairs disposed in parallel relation across the source ( $V_{in}$ ), the output node (103, 104) of one of the pairs being coupled to one end of the primary winding and the output node (105, 106) of the other of the pairs coupled to the other end of the primary winding, each switching element having a control input coupled to the switching element controller, the switching element controller adapted to produce respective switching element control signals at the control inputs so as to alternately invert the voltage from the DC voltage source ( $V_{in}$ ) across the primary winding.

Claim 40; Fraidlin et al, figure 1, disclose wherein the switching elements are MOSFETS each having respectively a source, a drain, and a gate, wherein the output nodes define respective connections between the source of one of the MOSFETS and the drain of another of the MOSFETS, and wherein the gates correspond respectively to the control inputs (see figure 1).

Claims 41-46; Fraidlin et al, figure 1, disclose a source controller adapted to control the set of switching elements to produce the alternating current by alternating the voltage across the

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secondary winding from one of a negative ON time during which the voltage is negative and a positive ON time during which the voltage is positive, to a dead time wherein the voltage is substantially zero, and then to the other of the negative ON time and the positive ON time, wherein the source controller is adapted to vary the duty cycle in a constant frequency mode of operation by varying the duration of the positive and negative ON times, for varying the power transferred through the transformer (col. 3 lines 8-31 and lines 45-67 thru col. 4 lines 1-40).

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fraidlin et al (US 6,038,142) in view of Laeuffer (US 6,324,080).

Claim 38; Fraidlin et al disclose the claimed subject matter in regards to claims 36 supra, except for wherein the rectifier circuit includes two rectifiers and two capacitors.

Laeuffer, figure 1, teaches using a two diode bridge rectifier (figure 1) with two capacitors Cf1, Cf2) in order to rectify and smooth the output voltage (col. 1 lines 63-67; col. 2 lines 1-24).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the circuit of Fraidlin et al to include a rectifier circuit that includes two rectifiers and two capacitors as taught by Laeuffer in order to rectify and smooth the output voltage.

12. Claims 47, 48, 50-52, 55, 58, 59, 61-63, 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fraidlin et al (US 6,038,142) in view of Saitou et al (US 4,991,075).

Claims 47 and 48; Fraidlin et al, figure 1, disclose a converter having a transformer (110) and a power output side (14), a source of DC current ( $V_{in}$ ) and a set of switching elements (103-106) for connecting the source to the primary winding; a bridge of rectifiers (119, 120);

However, Fraidlin et al do not disclose an inductor connecting the secondary and the alternating current input of the rectifier.

Saitou et al, figure 1, teach connecting one end of an inductor (5) to a secondary winding of a transformer and connecting the other end to a rectifying circuit (6, 7) in order to increase the switching frequency and increase the operational speed of a switching element (abstract; col. 2 lines 15-40; col. 3 lines 1-5).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Fraidlin et al to use an inductor connecting the secondary and the alternating current input of the rectifier in order to increase the switching frequency and increase the operational speed of a switching element as taught by Saitou et al.

Claims 50, 52 and 55; Fraidlin et al, figure 1, disclose a source controller adapted to control the set of switching elements to produce the alternating current by alternating the voltage across the secondary winding from one of a negative ON time during which said voltage is negative and a positive ON time during which the voltage is positive, to a dead time wherein the voltage is substantially zero, and then to the other of said negative ON time and said positive ON



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time, wherein the source controller is adapted to vary the duty cycle in a constant frequency mode of operation by varying the duration of the positive and negative ON times, for varying the power transferred through the transformer (col. 3 lines 8-31 and lines 45-67 thru col. 4 lines 1-40).

Claim 51; Fraidlin et al, figure 1, disclose wherein the switching elements are MOSFETS each having respectively a source, a drain, and a gate, wherein the output nodes define respective connections between the source of one of the MOSFETS and the drain of another of the MOSFETS, and wherein the gates correspond respectively to the control inputs (see figure 1).

Claims 58 and 59; Fraidlin et al, figure 1, disclose an inductor (111) connecting the source to the primary winding.

Claim 61; Fraidlin et al, figure 1, disclose wherein the set of switching elements comprises two pairs of controlled switching elements (103-16) and a switching element controller (124), the switching elements of each pair being coupled together in totem pole configuration at corresponding output nodes of the pair, the pairs disposed in parallel relation across the source ( $V_{in}$ ), the output node (103, 104) of one of the pairs being coupled to one end of the primary winding and the output node (105, 106) of the other of the pairs coupled to the other end of the primary winding, each switching element having a control input coupled to the switching element controller, the switching element controller adapted to produce respective switching element control signals at the control inputs so as to alternately invert the voltage from the DC voltage source ( $V_{in}$ ) across the primary winding.

Claim 62; Fraidlin et al, figure 1, disclose wherein the switching elements are MOSFETS each having respectively a source, a drain, and a gate, wherein the output nodes define respective

connections between the source of one of the MOSFETS and the drain of another of the MOSFETS, and wherein the gates correspond respectively to the control inputs (see figure 1).

Claims 63 and 66; Fraidlin et al, figure 1, disclose a source controller adapted to control the set of switching elements to produce the alternating current by alternating the voltage across the secondary winding from one of a negative ON time during which said voltage is negative and a positive ON time during which the voltage is positive, to a dead time wherein the voltage is substantially zero, and then to the other of said negative ON time and said positive ON time, wherein the source controller is adapted to vary the duty cycle in a constant frequency mode of operation by varying the duration of the positive and negative ON times, for varying the power transferred through the transformer (col. 3 lines 8-31 and lines 45-67 thru col. 4 lines 1-40).

13. Claims 49 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fraidlin et al (US 6,038,142) and Saitou et al (US 4,991,075) in view of Laeuffer (US 6,324,080).

Claims 49 and 60; Fraidlin et al and Saitou et al disclose the claimed subject matter in regards to claims 47 and 58 supra, except for wherein the rectifier circuit includes two rectifiers and two capacitors.

Laeuffer, figure 1, teaches using a two diode bridge rectifier (figure 1) with two capacitors Cf1, Cf2) in order to rectify and smooth the output voltage (col. 1 lines 63-67; col. 2 lines 1-24).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the circuit of Fraidlin et al to include a rectifier circuit that

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includes two rectifiers and two capacitors as taught by Laeuffer in order to rectify and smooth the output voltage.

14. Claims 53, 54, 56, 57, 64, 65, 67 and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fraidlin et al (US 6,038,142) and Saitou et al (US 4,991,075) in view of Bees (US 5,638,260).

Claims 53, 54, 56, 57, 64, 65, 67 and 68; Fraidlin et al and Saitou et al disclose the claimed subject matter in regards to claim 47 supra, except for time and said positive ON time, wherein the source controller is adapted to vary the duty cycle in a variable frequency mode of operation by varying the dead time.

Bees teaches a control circuit the controls a set of switching elements by variable frequency control which modulates the dead time between the switches by varying the frequency of switching (col. 2 lines 61-67; col. 3 lines 16-18; col. 4 lines 63-65).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the circuit combination of Fraidlin et al and Saitou et al to use variable frequency switching control in order to avoid overshoot and over-voltage conditions as taught by Bees (col. 36-50).

15. Claims 69 and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fraidlin et al (US 6,038,142) in view of Morris (US 5,555,494).

Claim 69; Fraidlin et al, figure 4, disclose a transformer (110) having a primary winding and a secondary winding, a source (Vin, 103-106) connected to the primary winding and adapted

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to produce alternating electrical current in the secondary winding, a rectifier circuit (119, 120) for receiving and rectifying the alternating electrical current, and at least one soft transition inductor (111), the power converter produces the alternating current by alternating the voltage across the secondary winding so that the voltage is one of being in a negative ON condition and a positive ON condition during a first active time and the voltage is the other of the negative ON condition and the positive ON condition during a second active time so that substantially all of the energy stored in the at least one soft transition inductor during the first active time is transferred to the power output prior to the second active time (col. 3 lines 8-31 and lines 45-67 thru col. 4 lines 1-40).

However, Fraidlin et al do not disclose the method comprising the step of controlling the source in a discontinuous conduction mode of operation and operating in critical conduction mode.

Morris in figure 2, teaches a source (10, SW1-SW4) and transformer (T) and operating the source in discontinuous mode (col. 15 lines 7-10) in order to return magnetizing energy to the primary (col. 4 lines 44-65; col. 15 lines 53-67).

Therefore, it would have been obvious at the time of the invention was made to modify the control circuit of Fraidlin et al to use discontinuous mode of operation in order to return magnetizing energy to the primary as taught by Morris (col. 15 lines 53-67).

Claim 73; Fraidlin et al, figure 4, disclose a transformer (110) having a primary winding and a secondary winding, a source (Vin, 103-106) connected to the primary winding and adapted to produce alternating electrical current in the secondary winding, a rectifier circuit (119, 120) for receiving and rectifying the alternating electrical current, and at least one soft transition

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inductor (111), the power converter produces the alternating current by alternating the voltage across the secondary winding so that the voltage is one of being in a negative ON condition and a positive ON condition during a first active time and the voltage is the other of the negative ON condition and the positive ON condition during a second active time so that substantially all of the energy stored in the at least one soft transition inductor during the first active time is transferred to the power output prior to the second active time (col. 3 lines 8-31 and lines 45-67 thru col. 4 lines 1-40).

However, Fraidlin et al do not disclose the method comprising the step of controlling the source in a continuous conduction mode of operation.

Morris in figure 2, teaches a source (10, SW1-SW4) and transformer (T) and operating the source in continuous mode in order eliminate the need to minimize magnetizing current, and eliminate conduction losses associated with flowing and recirculating magnetizing current in the primary (col. 4 lines 1-45; col. 11 line 27; col. 15 lines 53-67).

Therefore, it would have been obvious at the time of the invention was made to modify the control circuit of Fraidlin et al to use continuous mode of operation in order to eliminate the need to minimize magnetizing current, and eliminate conduction losses associated with flowing and recirculating magnetizing current in the primary and to be able to utilize an air core transformer assembly as taught by Morris (col. 4 lines 36-44).

16. Claim 70 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fraidlin et al (US 6,038,142) and Morris (US 5,555,494) in view of Konopka (US 5,969,481).

Claim 70; Fraidlin et al and Morris disclose the claimed subject matter as stated above in regards to claim 69 supra, except for operating in critical conduction mode.

Konopka teaches critical conduction mode operation as a design choice dependent upon several parameters and especially on the amount of power provided at the output of the converter (col. 4 lines 52-60).

Therefore, it would have been obvious to further operate in critical conduction mode as a design choice dependent upon several parameters and especially on the amount of power provided at the output of the converter in order to provide a more efficient power supply tailored especially for the designer's needs as taught by Konopka.

17. Claims 71 and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fraidlin et al and Morris (US 5,555,494) Konopka (US 5,969,481) in view of Bees (US 5,638,260).

Fraidlin et al, Morris and Konopka disclose the claimed subject matter as stated above in regards to claim 69 supra except for the controlling varies the frequency of at least one of the first and second active times as a function of the amount of the power consumed at the power output.

Bees teaches varying the frequency of a power supply circuit via a controller depending on what the load conditions (col. 2 lines 61-67; col. 3 lines 16-18; col. 4 lines 63-65).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the circuit combination of Fraidlin et al, Morris and Konopka to use variable frequency switching control in order to avoid overshoot and over-voltage conditions as taught by Bees (col. 36-50).

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18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gary L. Laxton whose telephone number is (703) 305-7039. The examiner can normally be reached on Monday thru Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Sherry can be reached on (703)308-1680. The fax phone number for the organization where this application or proceeding is assigned is (703)-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



Gary L. Laxton  
Patent Examiner  
Art Unit 2838

GLL